visions, but employ trade agents and dealers to work for them, and give heavy bribes to poorer men—men in the responsible position of keepers and coastguards, and also fishermen, shepherds, and others whose ignorance and poverty render them ready cat's-paws. The gamekeeper receives an intimation that a certain firm of "naturalists" will be happy to hear from him with regard to certain birds or eggs which may come to his notice, and will give him handsome terms; possibly the owner of the estate inquires later on whether a notable species which he was a little proud to have on his land is still there, and is told that it unfortunately attacked the chicks and had to be shot, or, more simply, that it has "disappeared." The crofter or the fisherman is told that the rich visitor at the hotel gives a wonderful sum for such-and-such eggs, which he hears are found on a neighbouring islet or moor, or that he wishes to be taken to see a nest, and will pay his guide well; and in a few years the bird has ceased to breed in that neighbourhood.

The creation of reserves has been advocated; various areas have been described in county council orders as "protected," in which birds or eggs may not be taken. But the creation of reserves or the definition of areas will not in themselves check unscrupulous collecting. For some years this society has, with the best results, employed watchers to guard certain breeding-places of rare birds. Some score of these are scattered over Great Britain, from the Shetlands and Orkneys to Sussex and Cornwall, and more will be employed as the much-needed funds permit; but the utmost care has to be exercised in their appointment; they must have fair pay to protect them to some extent from the temptation of bribes; and members of our watchers' committee visit their stations from time to time to inspect and judge actual results. Brean Down, of which the society rents the shooting rights, we hope to make a complete reserve for birds. It is exceptionally well suited for the purpose, and cannot well be visited without the knowledge of the watcher. Dungeness is a "protected area" guarded by the society's watchers during the breeding season. Yet at Dungeness a collector took advantage of a permit obtained by an unsuspicious friend to pocket all the eggs he could seize upon; followed by a watcher he was compelled to disgorge and restore every one. At Brean Down last spring the solitary young bird was taken from the peregrine's eyrie; an honorary watcher, discovering what had happened, pursued the culprit by motor-car, obtained the bird, brought it back to the down, and with considerable difficulty restored it to the nest.

On a protected island, a few seasons ago, permission to view was again gained by stratagem, and the visitor, closely followed, was at last impelled to say that "it was a pity to leave such nice eggs," and he would stand the consequences of taking them; the consequences happily worked out at 1*l.* per egg, and the eggs were forfeited. In Scotland the society has had to employ detective-inspectors, whose work called for vigilant circumspection. In Wales the kites' nests have to be guarded day and night. In many cases the eggs of harriers, ravens, peregrines, and other species are taken year after year, so that no young bird is ever reared, and only the presence of keen and determined watchers can stop this, or prevent the destruction finally of the parent birds. To the collector the idea of extermination of a species can suggest no regret; it would but add to the value and interest of his specimen.

Reserves and county council orders are admirable in intention; the latter are useful as affording possibility of conviction and fine where offenders are caught in the act. But as deterrents they avail nothing for persons of this class, and unless carefully worded may indeed serve to advertise the presence of a rare species. A law to deal with possession and the possessor is now absolutely necessary, as well as a strong public opinion which shall cause these collectors to be held in the contempt they deserve and shut them out from the society of decent naturalists. One proposal as to the kind of law needed has been made by Mr. W. H. Hudson ("Birds and Man," chap. xii.):—

"There is really only one way out of the difficulty—one remedy for an evil which grows in spite of penalties and public opinion—namely, a law to forbid the making of collections of British birds by private persons. . . . Without such a law it has now become impossible to save the best of our wild bird-life."

The words are even more true now than when they were written, and the time is more ripe for translating them into action. The old idea that not only must the ornithologist make collections, but that collections make the ornithologist, is giving way before the nature-reserve and the nature-student. But if the nature-reserve and the prohibition to take rare birds and rare eggs are to be more than a comfortable delusion, the open advertisement and the secret circular, the open incentive and the secret bribe for "procuring" specimens and for harrying nests, must be put a stop to. The source and motive, the *fons et origo,* of all these things is the private collection.

L. Gardiner,
Secretary, Royal Society for the Protection of Birds.
23 Queen Anne's Gate, London, S.W.

## Mechanically-formed Grikes in Sandstone.

In the Lower Old Red Sandstone of the west of Caithness I have noticed an appearance which recalls the grikes due to erosion of which Mr. Carus-Wilson writes in Nature of May 1. It is seen in the platform of marine denudation in a minor inlet on the north coast at the village of Reay, eleven miles west of Thurso. The dip of the rocks varies from 10° to 30°, averaging 17°, 10° west of north, and the low scarps, lying transverse to the axis of the bay, run down to the sea, giving rise to the tiny inlets locally known as "ports," or "porties."

At the harbour begins a thick sandstone, stretching in a southerly direction to a thickness of about 120 ft., which appears to pass laterally into the grey and blue flags so prevalent in the area. Separated from the main body of the sandstone by a flaggy sandstone and blue flag is the thin sandstone in which the "grikes" are seen.

There does not seem to be any lithological difference between the rock of the main body and that of the layer with the "grikes." Both are grey sandstone, which weathers to a light reddish-brown colour, and there is an appreciable amount of hæmatite present surrounding the quartz grains which make up the bulk of the rock. Felspars are fairly numerous and fresh, and there are wisps both of muscovite and biotite. The cement is largely micaceous, but calcite is present, and there has been some deposition of quartz from solution. The quartz grains are not well rounded.

The grooves are smaller than those Mr. Carus-Wilson mentions; the largest are about a foot deep and four inches wide, but the length of the longest is well over 16 ft. They run in two directions at right angles, parallel to the dip and strike, and the network is at places so fine that miniature stacks stand out, about 4 in. square in section.

As the place is about 40 yards below the beach of

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very coarse shingle one turns from the erosion hypothesis, and the slightly pitted nature of the rock surface suggests solution. ALEX. STEVENS.

Geological Department, University of Glasgow,
May 6.

### The Mountains and their Roots.

MAJOR COWIE's letter in NATURE of May 8 gives the impression that I had the facts of the observations on the deflection of the plumb-line in India before me, and that I made my assumptions as to relative densities, and the mode of compensation by extension of depressed crust beneath the plains, "suitably adjusted," so as if possible to bring out the desired results. This was not the case. I made the assumptions about relative densities which seemed to be *a priori* probable; and it will be seen from the diagram at p. 184 of my "Physics of the Earth's Crust" that fifteen years before I wrote the paper in the *Phil Mag.* I had suggested that compressed mountains would be partly supported by an extension of the depressed crust beyond them.

Should anyone be inclined to undertake the labour of calculating from my formulæ, introducing fresh constants, or other distances, I would warn him that in the *Phil. Mag.* there is a misprint. In the formula for the plateau, after the first bracket, insert $x$.

I am much pleased that after so long a time my theories are under discussion, and I hope to come well out of it. I am sending to the *Geological Magazine* a reply to some remarks by Sir T. H. Holland in that journal, and to this I would refer your readers as more fully giving my views on some of the points under discussion. O. FISHER.

Graveley, Huntingdon, May 9.

### An Application of Mathematics to Law.

I HAVE read Mr. Potts's letter in NATURE of April 24, but am at a loss to understand the use to which he would put his equations.

If it be his object to find some equation giving the validity of a patent or foretelling in any way the probability of its being upheld in a court of law, he has clearly failed to do anything of the sort.

If his equation $I = M + i$ is to be of any value, the quantity $i$ must have a fixed value greater than zero. In fact, however, for any given patent, $i$ may have an infinite number of values, including zero, since each person will have his own idea of the amount of ingenuity that must be shown in the particular case by the inventor. Thus the inventor will certainly put a high positive value upon $i$, while his opponent will as certainly say that the value of $i$ is zero. It is clear that the value of $i$ can only be finally settled when the validity of the patent has been settled by the House of Lords, and at this stage of a patent's career it is scarcely necessary to have an equation to test its validity. So far as the rest of his letter goes, he seems to have chosen a rather complex method of setting out a few of the chief principles of patent law.
R. STAFFORD CRIPPS.

Fulmer, Slough.

I DID not imagine that my letter would be taken as an attempt to supersede the present methods of determining validity. I intended it as a contribution to the theory which underlies the enormous volume of our case-law on the subject. Surely, as in other cases of the progress from empiricism to science, the first step must be in the direction of mathematical or symbolic expression of the facts. The value of such a symbolism is twofold: first, as an aid to precision of thought; and second, as a preliminary to generalisation. It is a vital principle of English law that all decisions shall harmonise with precedents as much as possible, and on this account alone anything should be of value which assists in formulating generalisations. We admit the value of theory in the physical sciences, apart from immediate practical results: why should an attempt to develop a theory of law be condemned because it does not at once do away with the functions of the judge?

Mr. Cripps's difficulty as to the value of $i$ will not be so great if the actual cases given in my letter are studied. I may add here, however, that it is immaterial what this value is, provided that it is measurably greater than zero. It is settled law that a scintilla of ingenuity is sufficient to support a patent for something new and useful (*cf.* Thompson *v.* Amer. Braided Wire Co., in the House of Lords, and other cases). I therefore employed this symbol merely to indicate that there had to be some positive difference.
HAROLD E. POTTS.

University Club, Liverpool.

## *SYNTHETIC BIOLOGY AND THE MECHANISM OF LIFE.*

THE presidential address delivered by Prof. Schäfer to the British Association in 1912, and the subsequent independent discussion at a joint sitting of two of the sections, served, as was pointed out by Prof. Armstrong in a paper in *Science Progress* in October last, "as a useful corrective to the wave of vitalism that has passed over society of late years owing to the pervasive eloquence of Bergson and other writers." Probably the majority of those who have studied the phenomena of life from the chemical side will agree with Prof. Schäfer in his dictum that "at the best vitalism explains nothing," and accept his opinion "that we may fairly conclude that all changes in living substance are brought about by ordinary chemical and physical forces." The difficulty, however, lies in obtaining any satisfactory information as to what are the actual chemical or physical changes which occur in the real living cells or tissues. Since this discussion was held Prof. S. Leduc, of the School of Medicine at Nantes, has published a monograph[1] in which he approaches the problem from the novel point of view which now for several years past has guided his experiments and with which readers of his "Mechanism of Life" will be familiar.

It is impossible to do justice to the author's arguments or make clear the proper value of his demonstrations in a short article such as the present, but this will at least serve to direct attention to a few of the very remarkable results that he claims to have achieved, which, if verified, are certainly of the highest significance to the student of the phenomena of life.

The basis of Prof. Leduc's work may be summarised in his own words as follows: "It is in the physico-chemistry of liquids that an explanation of the phenomena of life is to be sought"; and he develops his views largely by studying the nature of diffusion in liquids and the phenomena

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[1] "La Biologie Synthétique." By Prof. Stéphane Leduc. Pp. ii+217 (Paris: A. Poinat, 1912.)

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